

B<sup>3</sup>  
a metering orifice in said conduit between said solenoid operated valve and said bearings;

a control circuit for pulsing said solenoid at a controlled rate to alternately (a) allow oil flow and (b) halt oil flow to said bearing for a time insufficient to prevent oil starvation of said bearings; and

said control circuit receiving inputs representing vehicle velocity, vehicle altitude and lubricating oil or ambient temperature.

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Amend Claim 13 as follows:

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13. (Amended) A non-recirculating lubricating system for an expendable gas turbine engine comprising:

a rotatable shaft within said turbine engine;

bearings journaling said shaft for rotation about an axis;

a vessel containing lubricating oil;

a conduit extending from said vessel to said bearings;

a solenoid operated valve in said conduit and operable only to either fully open or fully close; and

a control circuit for pulsing said solenoid at a controlled rate to alternately (a) allow oil flow and (b) halt oil flow to said bearings for a time insufficient to cause oil starvation of said bearings.

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#### REMARKS

The specification has been amended to correct informalities. The drawings have been amended to correct informalities. Independent Claims 1, 11 and 13 have been amended. Insertions and deletions to the amended claims are indicated in the Appendix. Claims 1 through 13 remain active in this Application.

Independent Claims 1, 11 and 13 have been amended to clarify the claimed invention. In particular, they have been amended to claim a "Non-recirculating lubrication system for an expendable gas turbine engine" that completely distinguishes the claimed invention from the cited prior art. These claims have also been amended to correct an informality. In particular, they have been amended to include a rotatable shaft within the gas turbine engine as part of the lubrication system instead of the gas turbine engine itself as part of the lubrication system.

The Examiner has objected to the drawings. In particular, the Examiner has alleged that the reference character "66" has been used to designate both the inlet and outlet to the tank in Figure 2. The outlet reference character has been changed to 68 in the attached marked drawing as shown in red. The specification has been amended to accord with this change on page 7, line 20. In addition, the Examiner has objected to the reference to the engine 20 instead of the engine compressor 22 in Figure 4. This has been changed in the attached marked drawing in red.

Finally, the Examiner has objected to the use of the reference character 116 in Figure 6 as allegedly not mentioned in the specification. The Applicants respectfully traverse this objection. The specification refers to "an arrow 116" on page 10, line 12.

In view of the amendments to the drawings and remarks set forth above, the Applicants respectfully request that the objections to the drawings be reconsidered and withdrawn.

The Examiner has objected to the declaration for allegedly not indicating the complete post office addresses of the inventors, including the ZIP code designation. The Applicants respectfully traverse this objection. The attached copy of the declaration as filed includes the ZIP codes for each of the two inventors. The Applicants respectfully request that the objection to the Declaration be reconsidered and withdrawn.

The specification has been objected to for not indicating a relationship between "control 16" and "control 50". The Applicants can find no reference to "control 50", only "source 50". However, the Applicants discovered an informality on page 7, line 14 that incorrectly referred to "lubricating oil source 50" that should have referred to "lubricating oil source 46". This has been corrected by amendment, and the Applicants assume that the Examiner's objection is actually to this discrepancy. The Applicants therefore request that this objection to the specification be reconsidered and withdrawn.

The Examiner has rejected Claim 13 under 35 U.S.C. § 102(b) for alleged anticipation by Hibner et al. Claim 13 has also been rejected under 35 U.S.C. § 103(a) for alleged obviousness over Waddington et al. in view of Zankl and further in view of Swearington. Claims 1, 3 and 5 through 12 have been rejected under 35 U.S.C. § 103(a) for alleged obviousness over Waddington et al. in view of Zankl and further in view of either McCarty or Schulze.

The Applicants respectfully traverse these rejections for the following reason. Independent Claims 1, 11 and 13 have all been amended to specifically claim a non-recirculating lubrication system. As explained in the specification, this reduces the cost and weight of providing a recirculating oil pump and associated plumbing. See, in particular, page 1, lines 11 through 14 of the specification. All of the references cited by the Examiner, including Swearington, are directed to conventional recirculating lubrication systems that have a primary system that include an indispensable recirculating oil pump. The temporary reserve system described in Swearington is not designed as or capable of acting as a sole source of lubricating fluid – only as a temporary backup for the main recirculating system. In contrast, the claimed non-recirculating system as recited in independent Claims 1, 11 and 13 make the use of a bladder-type lubrication source with the unique metering system practical as a main lubrication system for a gas turbine engine. Therefore, the Applicants respectfully request that the rejections of Claims 1, 11 and 13 be reconsidered and withdrawn. Since dependent Claims 2 through 10 depend directly or indirectly from independent Claim 1 and dependent Claim 12 depends from independent Claim 11, the Applicants respectfully request that the rejections of Claims 2 through 10 and 12 be reconsidered and withdrawn for the same reasons as described for Claims 1, 11 and 13, as well as because these claims have additional limitations that further distinguish them from the cited prior art.

In view of the amendments to the claims set forth above, the Applicant respectfully requests that the outstanding objections to the drawings, specification and declaration and the outstanding rejections of Claims 1 through 13 be reconsidered and withdrawn, that Claims 1 through 13 be found in condition for allowance, and that this Application be allowed to issue.

Respectfully submitted,

  
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## APPENDIX

### IN THE SPECIFICATION

Page 7, line 14, delete the last paragraph that extends from line 14 to line 20 and replace it with the following paragraph:

One form of the lubricating oil source [50] 46 is shown in Fig. 2 and is seen to include an arcuate tank 60 shaped to fit within the body 10 and containing an interior, flexible bladder 62. A body of lubricating oil 64 is contained within the bladder 62. An inlet to the tank 60 is shown schematically at 66 and is connected to the pressurized gas source 50 in a manner to be seen. In any event, upon the admission of pressurized gas to the interior of the tank 60 via the inlet 66, pressure is exerted against the bladder 62 to expel the lubricant 64 via an outlet [66] 68 connected to the conduit 58.

### IN THE CLAIMS

Amend Claim 1 as follows:

1. (Amended) A non-recirculating lubrication system for an expendable gas turbine engine comprising:

[a gas turbine engine having] a rotatable shaft within said turbine engine;

bearings journaling said shaft for rotation about an axis;

a tank;

a bladder within said tank;

a source of gas under pressure;

one of said tank and said bladder containing lubricating oil for said bearings;

the other of said tank and said bladder being connectable to said source of gas under pressure;

a conduit extending from said one of said tank and said bladder containing lubricating oil to said bearings;

a solenoid operated valve in said conduit and operable only to either fully open or fully close; and

a control circuit for pulsing said solenoid at a controlled rate to alternately (a) allow oil flow and (b) halt oil flow to said bearings for a time insufficient to cause oil starvation of said bearings.

Amend Claim 11 as follows:

11. (Amended) A non-recirculating lubrication system for an expendable gas turbine engine in an airborne vehicle engine comprising:

[a turbojet engine having] a rotatable shaft within said turbine engine;

bearings journaling said shaft for rotation about an axis;

a tank;

a bladder within said tank;

a source of gas under pressure;

one of said tank and said bladder containing lubricating oil for said bearings;

the other of said tank and said bladder being connectable to said source of gas under pressure;

a pressure regulator interconnecting said source of gas under pressure and said other of said tank and said bladder;

a conduit extending from said one of said tank and said bladder containing lubricating oil to said bearings;

a solenoid operated valve in said conduit and operable only to either fully open or fully close;

a metering orifice in said conduit between said solenoid operated valve and said bearings;

a control circuit for pulsing said solenoid at a controlled rate to alternately (a) allow oil flow and (b) halt oil flow to said bearing for a time insufficient to prevent oil starvation of said bearings; and

said control circuit receiving inputs representing vehicle velocity, vehicle altitude and lubricating oil or ambient temperature.

Amend Claim 13 as follows:

13. (Amended) A non-recirculating lubricating system for an expendable gas turbine engine comprising:

[a gas turbine engine having] a rotatable shaft within said turbine engine;

bearings journaling said shaft for rotation about an axis;

a vessel containing lubricating oil;

a conduit extending from said vessel to said bearings;

a solenoid operated valve in said conduit and operable only to either fully open or fully close; and

a control circuit for pulsing said solenoid at a controlled rate to alternately (a) allow oil flow and (b) halt oil flow to said bearings for a time insufficient to cause oil starvation of said bearings.